



van der Velden, Naomi (2012) Multispecies systems in agroecology. In: British Ecological Society 1st Annual Meeting of the Agricultural Ecology Special Interest Group, 1-2 November 2012, Charles Darwin House, London. (Unpublished)

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Multi-species systems in Agroecology



Dr N.K. van der Velden



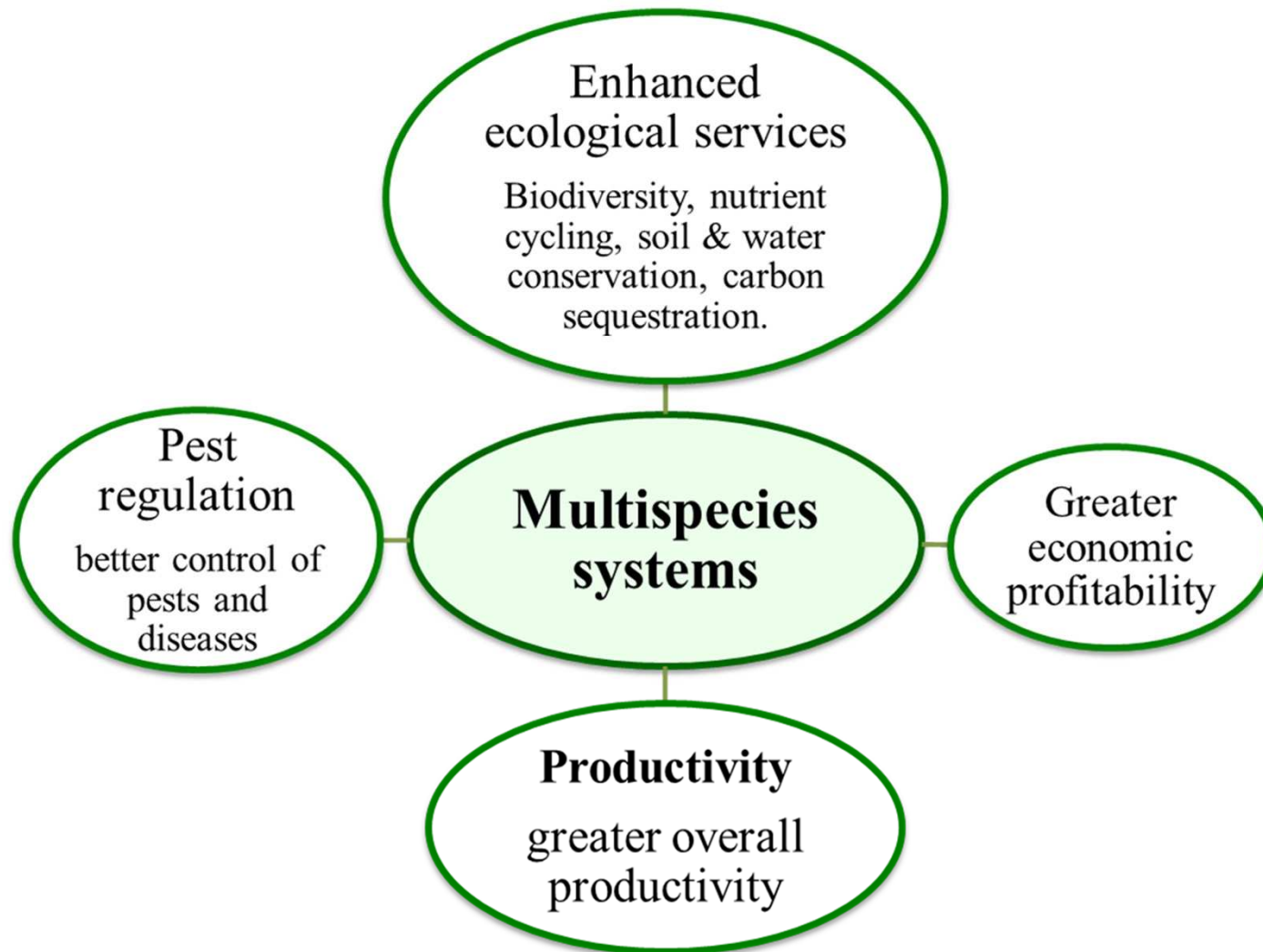
UNIVERSITY of
Cumbria

BES 1st Agroecology meeting
1st 2nd November 2012, London

Sustainable agriculture...

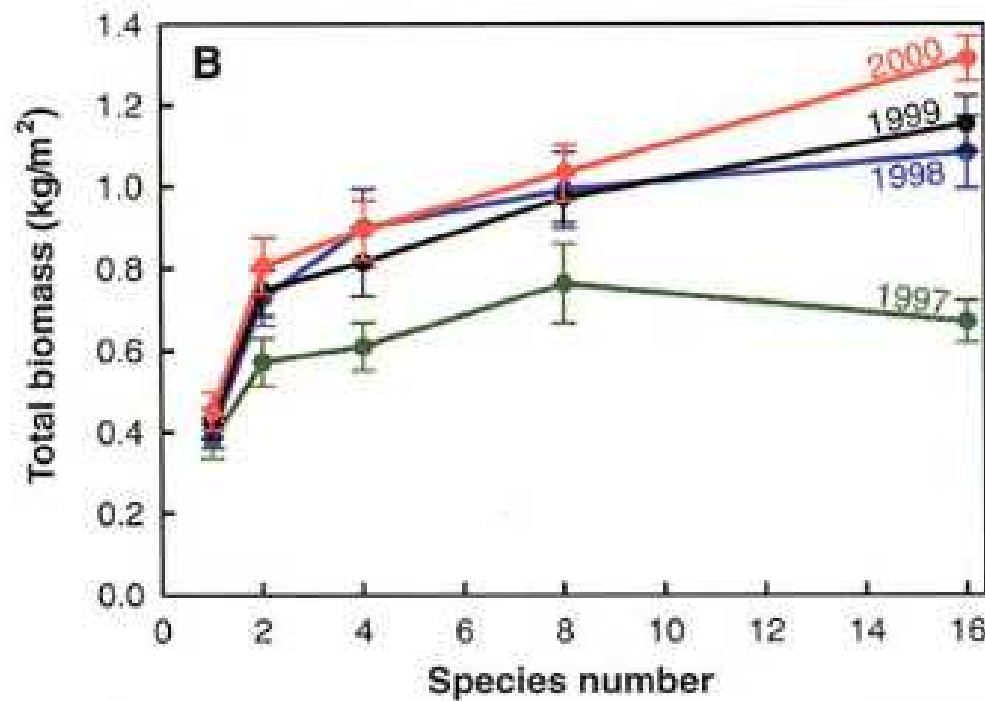


Benefits of multispecies systems



Diversity and production

“16-species plots attain 2.7 times greater biomass than monocultures”



Tilman *et al.*, 2001. *Science* **294** (5543) 843-845

Use of multispecies systems

- Subsistence production (tropics)
- Agroforestry (tropics, then temperate)
- Cottage gardens (European)

Little commercial production

Few published studies on barriers to use

Given the apparent advantages, why aren't they more used?

Use of multispecies systems

Given the apparent advantages, why aren't they more used?

Mechanisation? Labour costs

Complication? Knowledge and experience

Unfamiliarity? Trying new things - risk

Unpredictable yields? **Opportunity cost?**

Scale?

Scale in multispecies systems



Tamsin Borlase

Market gardens?

e.g. Bosley Patch,
Henley-on-Thames



Val Miles

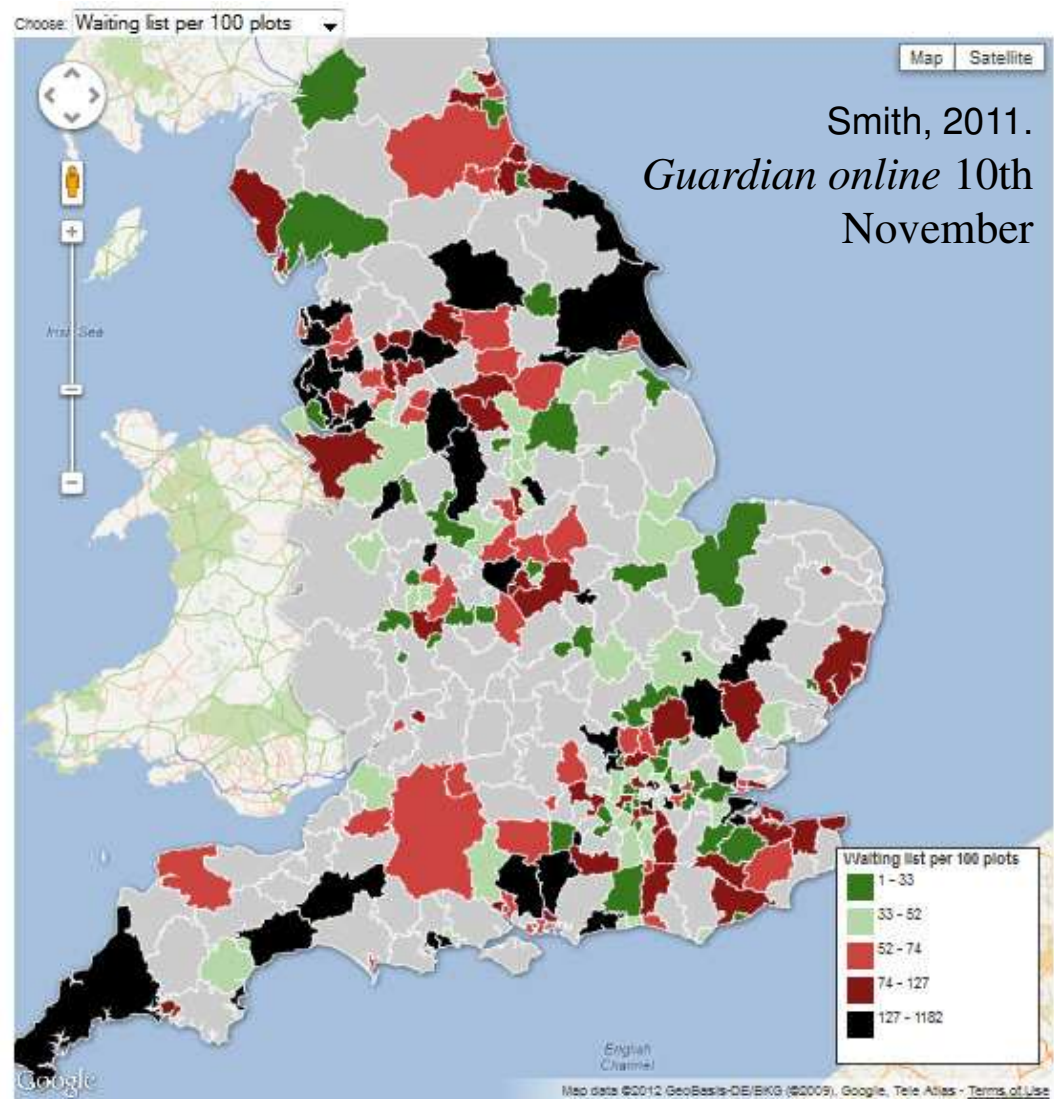
Allotments?

Household food production

Similar issues of land availability as in global agriculture

“Allotment demand leads to 40-year waiting lists”

Jones, 2009.
Guardian online 2nd June



Polyculture Productivity:

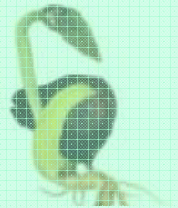
Diversity and Efficiency in “grow your own” food production



Naomi van der Velden¹, Andy Goldring², Tomas Remiarz²,
Roz Brown², Ian Fitzpatrick²



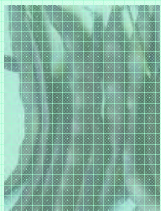
Aim



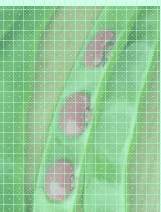
Methods



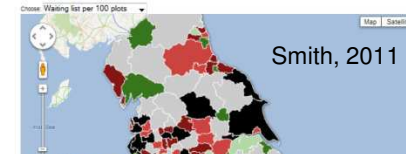
Results



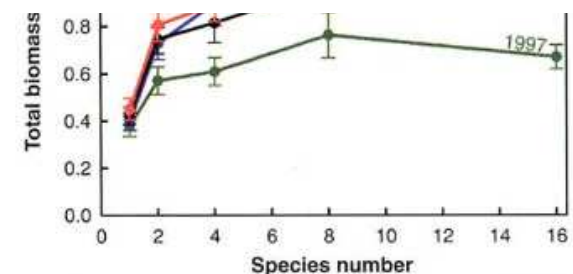
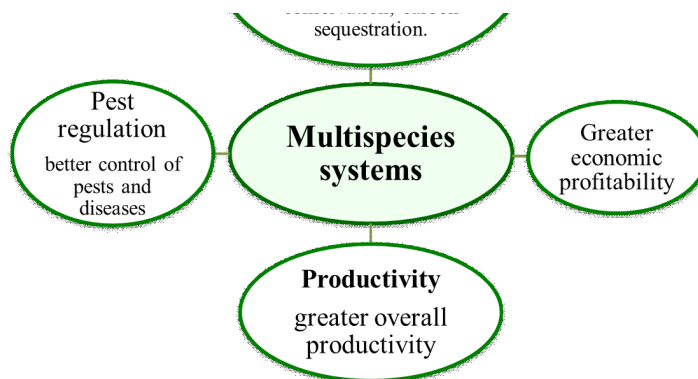
Context



Diversity and production



Aim: To compare productivity of Low- and High-diversity mixes of veg in household gardens





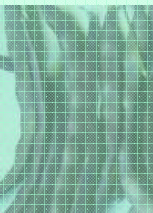
Rationale



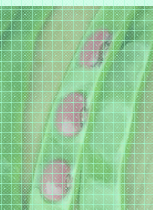
Methods



Results



Context



Public participatory trial



7 plant families
12 crops (plus 1
flower).

50 sets of seeds
to participants

Weigh each crop
every harvest.

Record time spent
on each plot.

Questionnaires

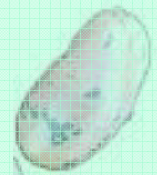


Photo by C. Atkinson

Mixed vegetable research trials (2011)
Information for participants

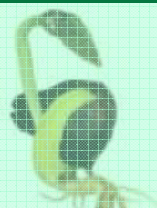


*Working in partnership with
the National School of
Forestry and Centre for
Wildlife Conservation at the
University of Cumbria*



Rationale

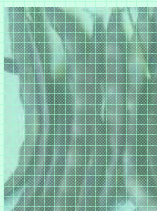
Veg production



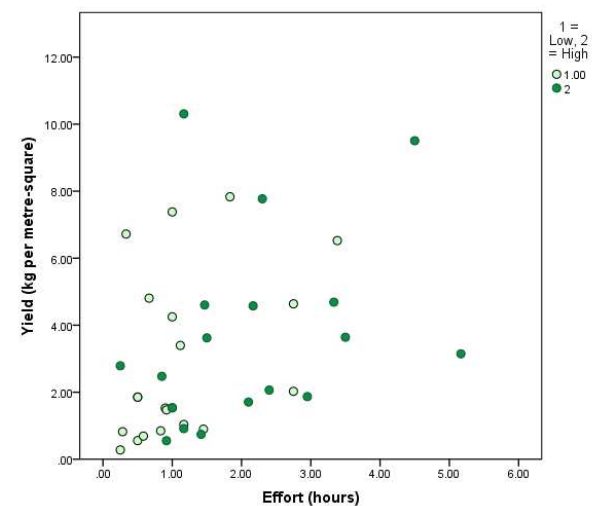
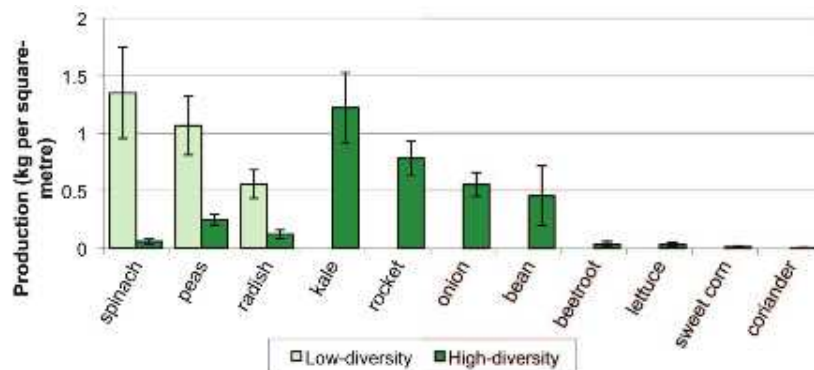
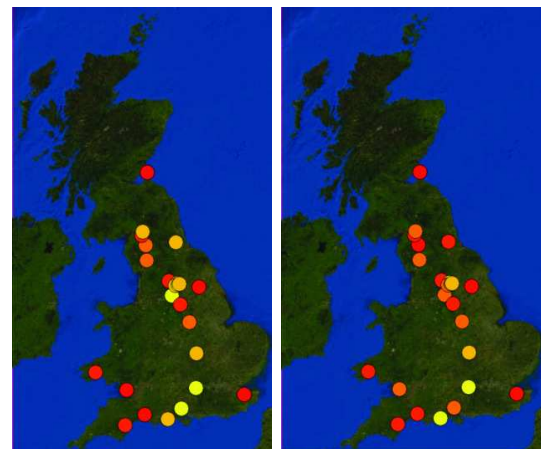
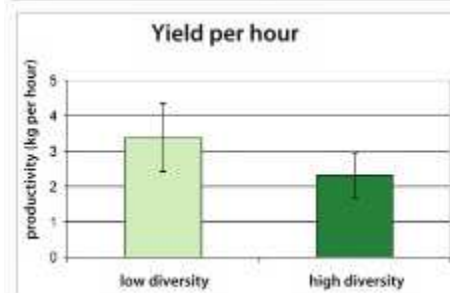
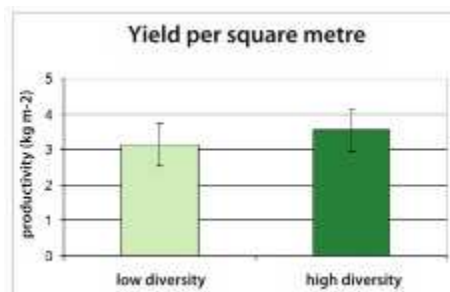
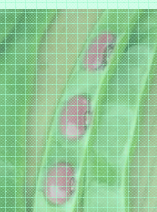
Methods

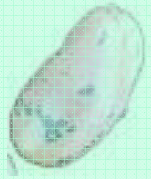


Results



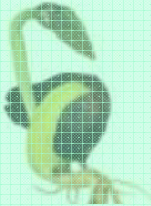
Context





Rationale

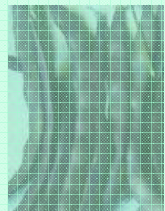
Veg production



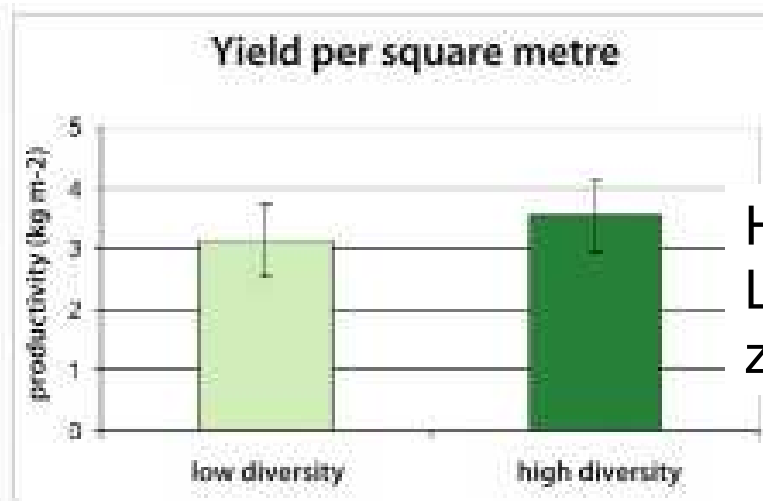
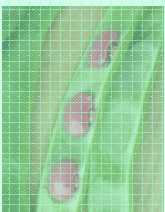
Methods



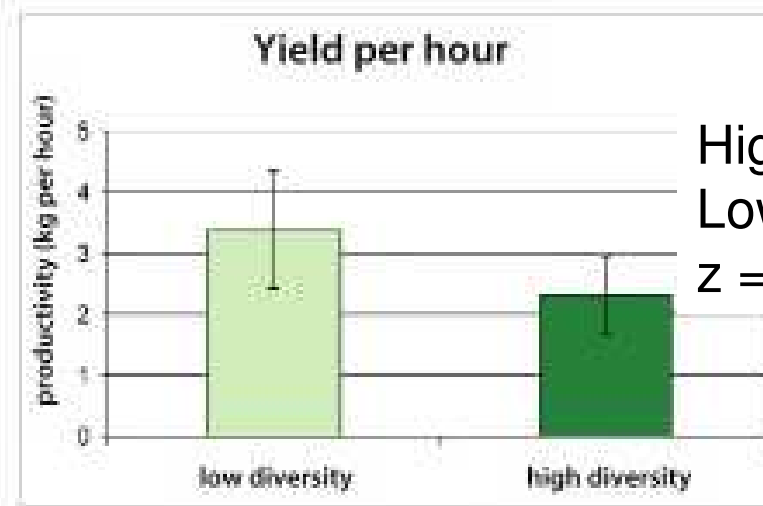
Results



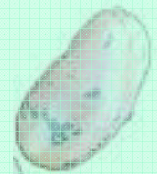
Context



High $3.5 \pm 0.6 \text{ kg m}^{-2}$
Low $3.1 \pm 0.6 \text{ kg m}^{-2}$
 $z = 1.154, p = 0.130.$

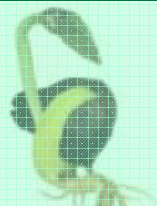


High $2.3 \pm 0.6 \text{ kg m}^{-2} \text{ hr}^{-1}$
Low $3.4 \pm 1.0 \text{ kg m}^{-2} \text{ hr}^{-1}$
 $z = 1.680, p = 0.093$



Rationale

Veg production



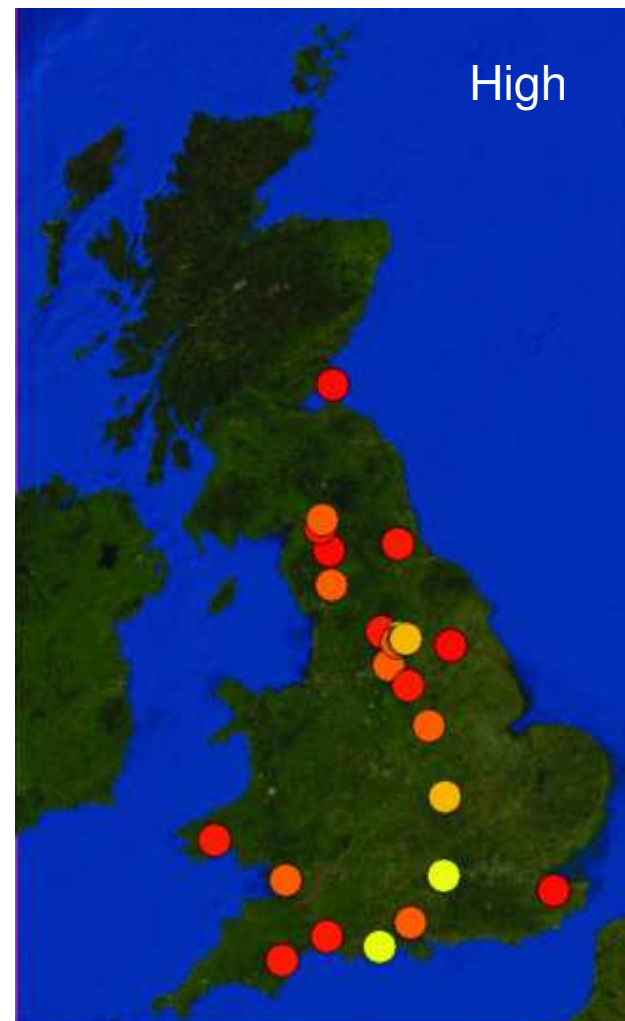
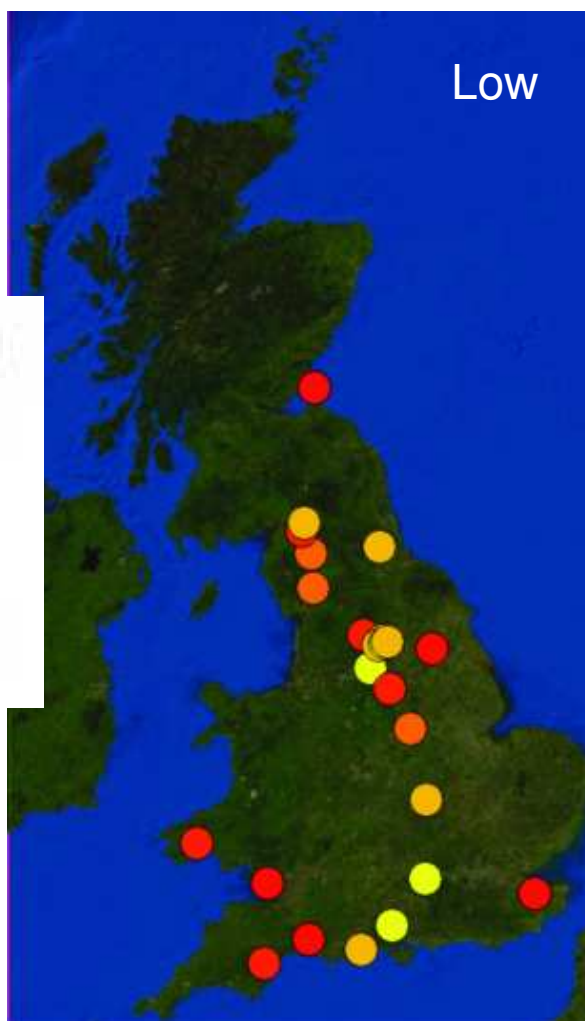
Methods

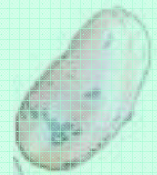


Results



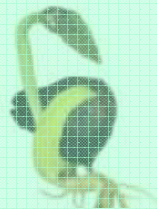
Context





Rationale

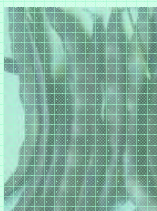
Veg production



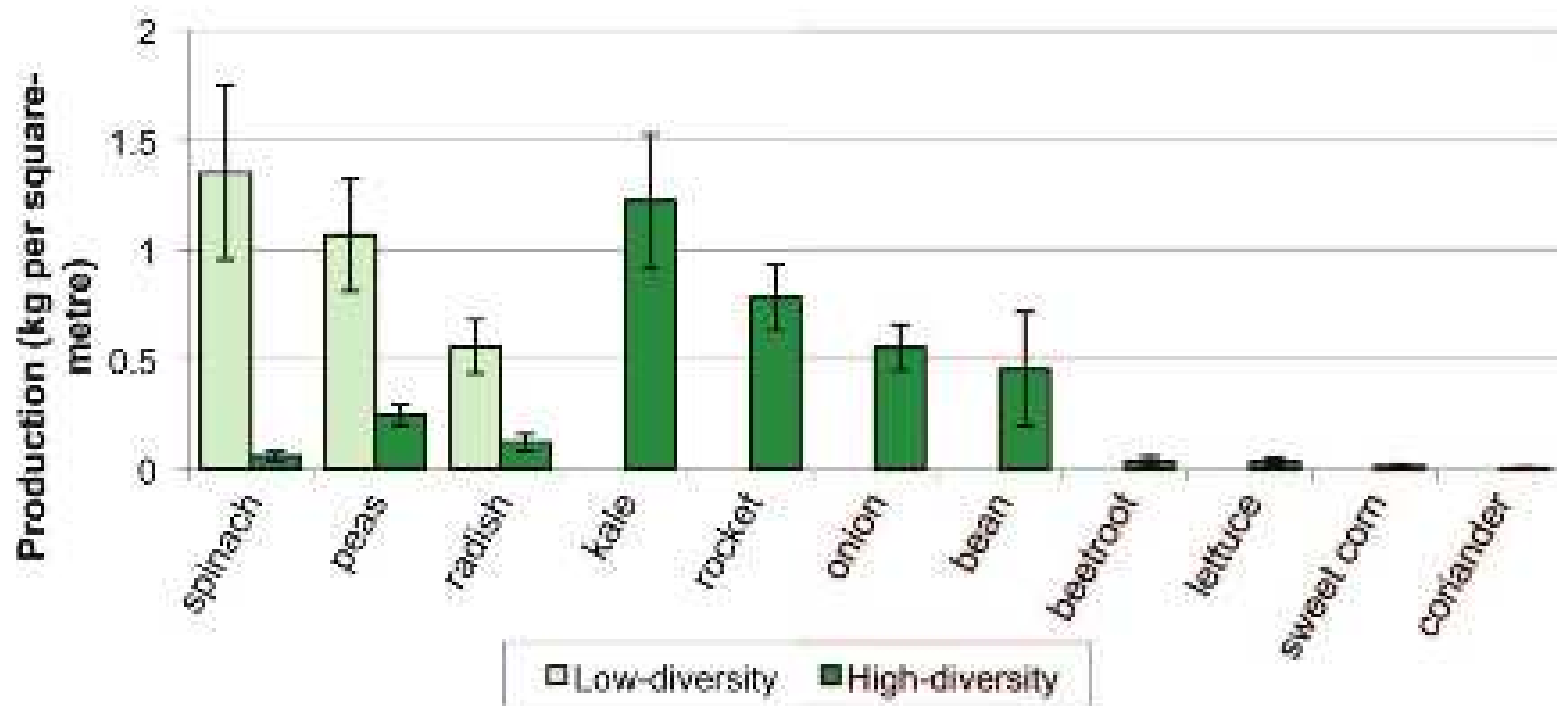
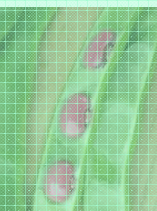
Methods



Results



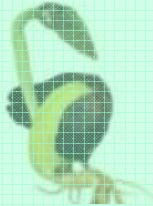
Context





Rationale

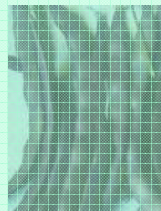
Veg production



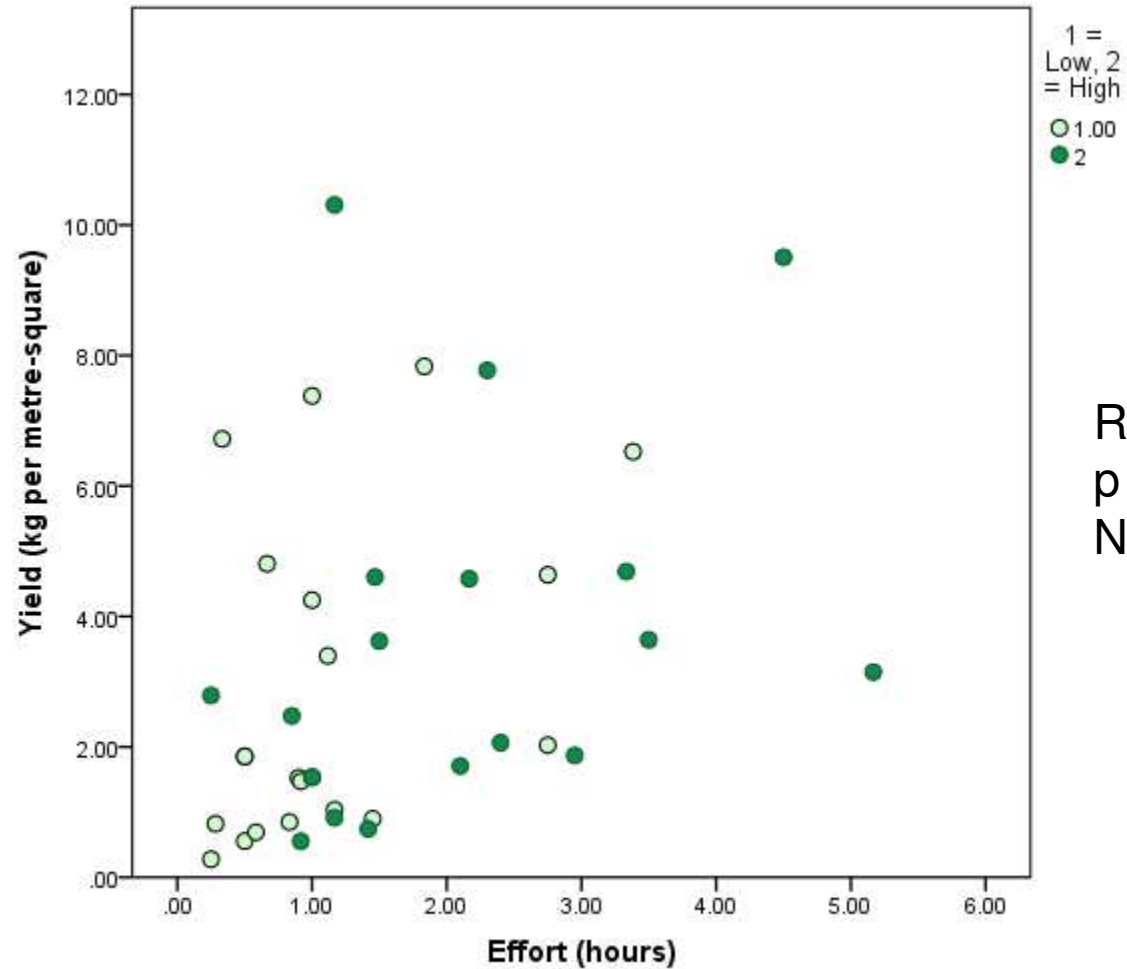
Methods



Results



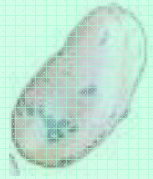
Context



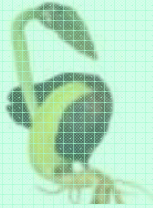
$R = 0.462$

$p = 0.03$

$N = 39$



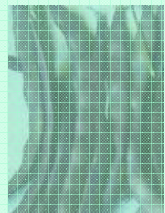
Rationale



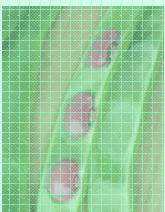
Methods



Results



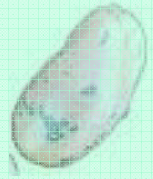
Context



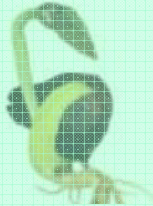
Veg production



- Average production was equivalent to 35 tonnes per hectare.
- No significant difference in total yields
- Significant differences in individual species (More peas, spinach & radish from Low-diversity plot)
- Production linked to effort (50%), plus probable differences in soil, weather, location etc.



Rationale



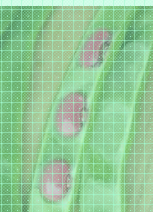
Methods



Results



Context



Context and next steps



Household yields are high; 35 tonnes ha⁻¹.

- Allotment yields of 16 tonnes ha⁻¹, Supplying 10% of UK food production. (Stamp, 1948)
- UK field veg yields 19 tonnes ha⁻¹ in 2011 (BHS, 2012)

Polycultures may yield more than monocultures at this scale.

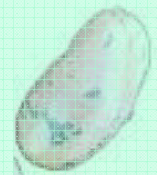
Production linked to effort (50%). **Time costs are leisure time.**
Additional health benefits to gardening (Leake *et al.*, 2009)

Own-produced food could meet some [UK] food demand in a low input, low-impact way. How much?

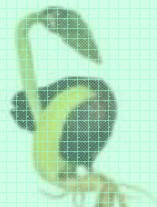
BHS – British Horticultural Society info [online records]

Leake *et al.*, 2009 . *Environmental Health* 2009, **8**(Suppl 1):S6

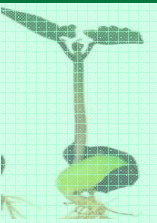
Stamp, 1948 *The Land of Britain: it's use and misuse*. Longmans, Green & Co.



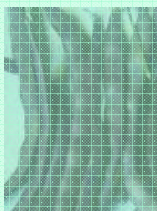
Rationale



Methods



Results



Context



References



Jones, R. 2009 “Allotment demand leads to 40-year waiting lists” *Guardian online* 2nd June [accessed 14/8/12]

<http://www.guardian.co.uk/money/2009/jun/02/allotments-shortage-waiting-lists>

Malézieux *et al.*, 2009 Mixing plant species in cropping systems: concepts, tools and models. A review *Agron. Sustain. Dev.* **29** 43–62

Smith, A.P. 2011 “The English allotment lottery mapped” *Guardian online* 10th November [accessed 14/8/12].

<http://www.guardian.co.uk/news/datablog/interactive/2011/nov/10/allotments-rents-waiting-list-england>

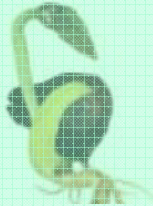
Stamp, 1948 *The Land of Britain: its use and misuse*. Longmans, Green and Co. London

Tilman *et al.*, 2001 Diversity and Productivity in a Long-Term Grassland Experiment. *Science* **294** (5543) 843-845.



Rationale

Thanks!



Methods

Thanks - For listening!

To all the participants, to co-ordinators Celia Ashman and Edgars at the Permaculture Association. To Chris Evans for advice on appropriate plant mixes. Thanks to these seed companies for supplying the seeds



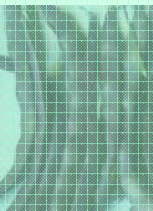
Results

BEANS and Herbs

Chase  Organics
IAN ALLAN GROUP

TUCKERS
SEEDS

garden
organic



Context

Contact : n.k.vandervelden@cumbria.ac.uk

